LEVERAGING THE WATER QUALITY PORTAL TO CHARACTERIZE HISTORIC CONDITIONS UNDER A TIGHT TIME-FRAME: A LESSONS LEARNED REPORT

OR….

HOW THE PORTAL SAVED THE DAY

DWANE YOUNG, US EPA, OFFICE OF WATER

MAY 4, 2016

BACKGROUND

- Although this story centers around the Gold King Mine release, it really could be any event
- How can we answer the question: "What did it look like before the event?"
- What if you need to answer that question quickly?

DAY 1: 4:00 PM

Request: We need to be able to say something about what historical data we have. We have STORET, what can we say?

Our hero: The Portal has this data, let me see what we can find

- After a quick assembly of the four 8-digit HUCs that were downstream of the release, and a quick check of the Portal, the data seemed quite available

At this point, our hero doesn't know that he just stepped into quick sand….

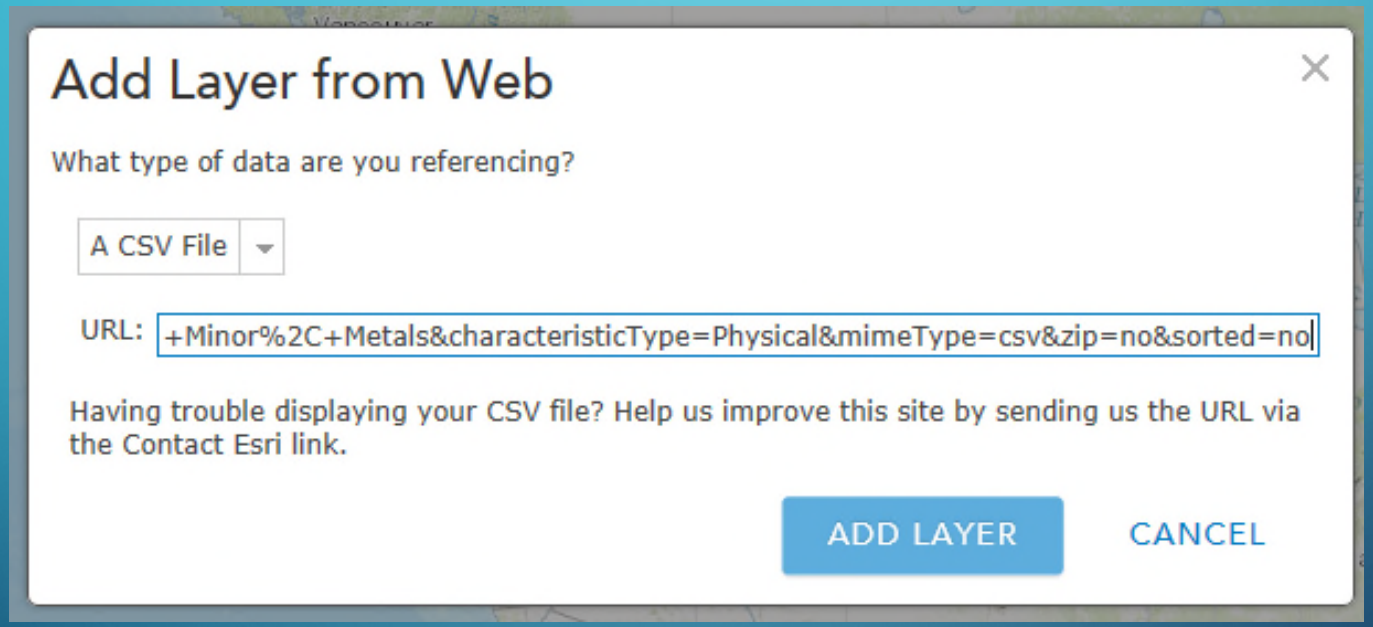
DAY 1: 6:00 PM

After a somewhat painful commute home, our hero fires up his Mac….

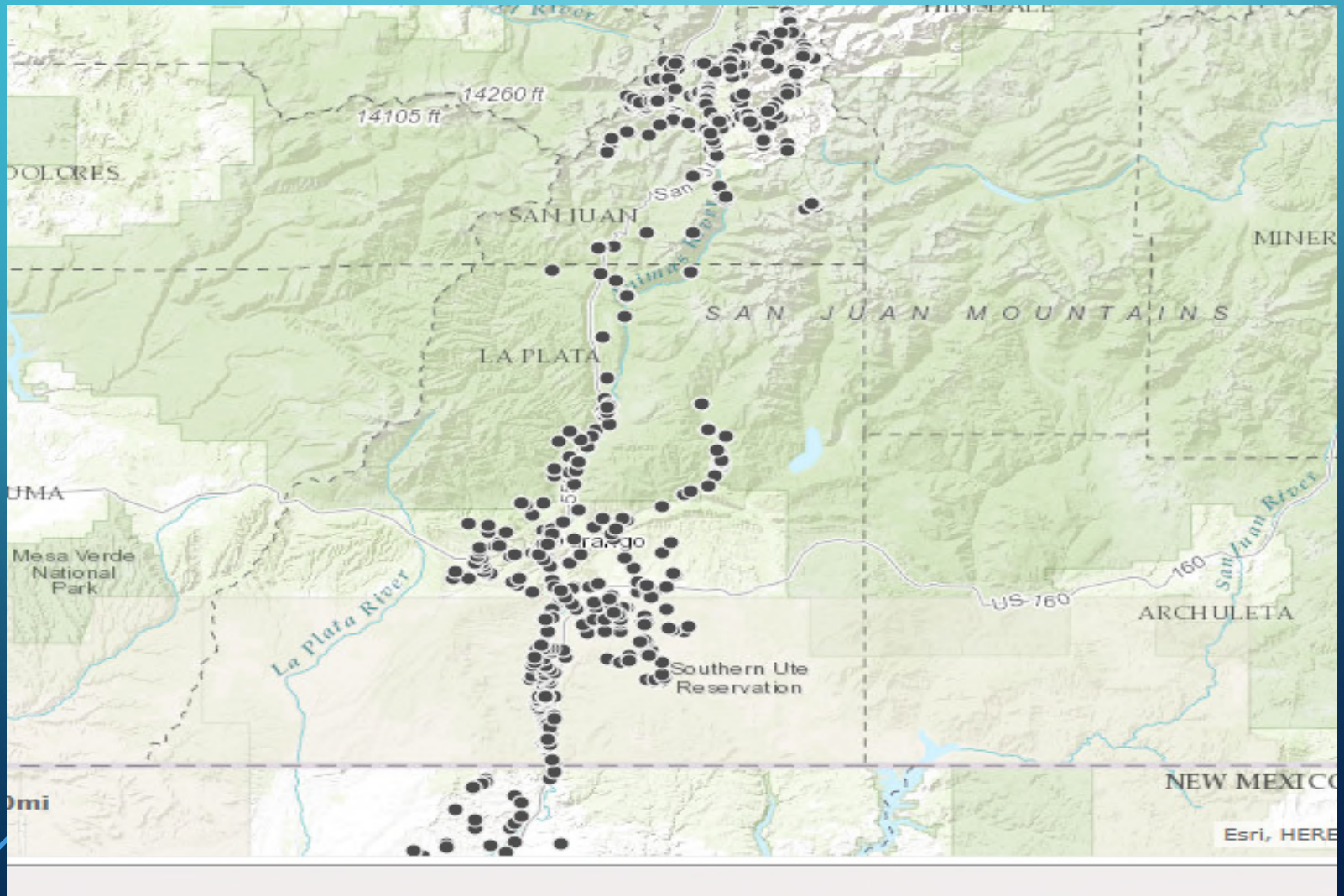
With a quick check again against the Portal for only Metals and pH data, we are able to generate a very basic URL that will retrieve the stations for each HUC:

http://www.waterqualitydata.us/Station/search?huc=14080104&characteristicType=Inorganics%2C+Major%2C+Metals&characteristicType=Inorganics%2C+Minor%2C+Metals&characteristicType=Physical&mimeType=csv&zip=no&sorted=no

DAY 1: 6:15 PM – "TO ARC GIS ONLINE ROBIN!"



DAY 1: 6:30 PM – NOW JUST REPEAT FOR ALL FOUR HUCS, CLEAN IT UP, ADD LINKS TO DOWNLOAD THE RESULTS, AND SHARE IT OUT – DONE!



DAY 2: 8:00 AM

Our silly hero, thought he was done, and started working on other projects….

DAY 2: 10:00 AM

Request: The map looks great, but…. we really need a summary of all the data by each 8-digit HUC. We're meeting tomorrow morning, and it would be good to have that summary by then.

No problem… "Back to the Portal!"

DAY 2: 10:30 AM

All the data are downloaded from the Portal, loaded into a local ACCESS database, and our hero begins the process of developing the queries to summarize the data.

Needed to know the following:

- Who collected the data
- Their period of records
- Maximum Values
- Summaries by HUC and Station
- Minimum Values
- Averages
- Quartiles
- Range of values for each parameter

DAY 2: 3:00 PM

With a little ACCESS magic, the summaries are starting to come together. With a little more QA, everything should be ready by morning

SUMMARY FOF THE MIDDLE SAN JUAN RIVER WATERSHED (14080105)

ORGANZIATION SUMMARY: Middle San Juan River Watershed (14080105)						
HUC	Organization ID	Organization Name	Num of Stations	Total Number of Samples	Start Date	End Date
14080105	11NPSWRD	National Park Service Water Resources Division	22	39	5/23/1976	9/6/1977
14080105	21COL001	Colorado Dept. of Public Health & Environment	6	414	1/23/1968	5/23/2006
14080105	21COL001_WQX	Colorado Dept. of Public Health & Environment-WQCD	2	16	8/18/2009	6/14/2011
14080105	21NMEX	NM Environmental Dept./SWQB	8	137	4/16/2002	10/29/2002
14080105	21NMEX_WQX	NM Environmental Dept./SWQB	13	245	4/27/2005	11/2/2010
14080105	CORIVWCH_WQX	The Rivers of Colorado Water Watch Network (RiverWatch)	6	868	11/5/1995	6/3/2015
14080105	NARS	EPA National Aquatic Resource Survey Data	1	1	6/26/2001	6/26/2001
14080105	NARS_WQX	EPA National Aquatic Resources Survey	1	2	6/26/2001	6/26/2001
14080105	SOUTHUTE	Southern Ute Tribe	4	225	6/24/1992	8/28/2013
14080105	USGS-AZ	USGS Arizona Water Science Center	6	8	10/4/1957	6/22/1972
14080105	USGS-CO	USGS Colorado Water Science Center	72	172	9/18/1958	9/4/2002
14080105	USGS-NM	USGS New Mexico Water Science Center	25	3083	2/29/1944	8/12/2015
14080105	UTEMTN	Ute Mountain Utes Tribe (Colorado)	4	4	1/16/2002	1/22/2002

DAY 3: 10:00 AM

Summaries all get shared, some immediate lessons learned:

- Some of the data are pretty old. What data can reasonably be used?
- Some of the data providers appeared to have run into issues with sharing the most current data
- This only wets the appetite for the actual data, not just the summaries
- Also want to know what samples are on the mainstem, not just in the 8-digit HUC

Luckily, it's a Thursday… That means tomorrow is a Tech-Friday to see what else can be done.

DAY 4: 7:30 AM – TECH FRIDAY!

Problem: How can we provide the data in an easy accessible format that provides the relevant main stem data?

BACK TO ARC GIS ONLINE!

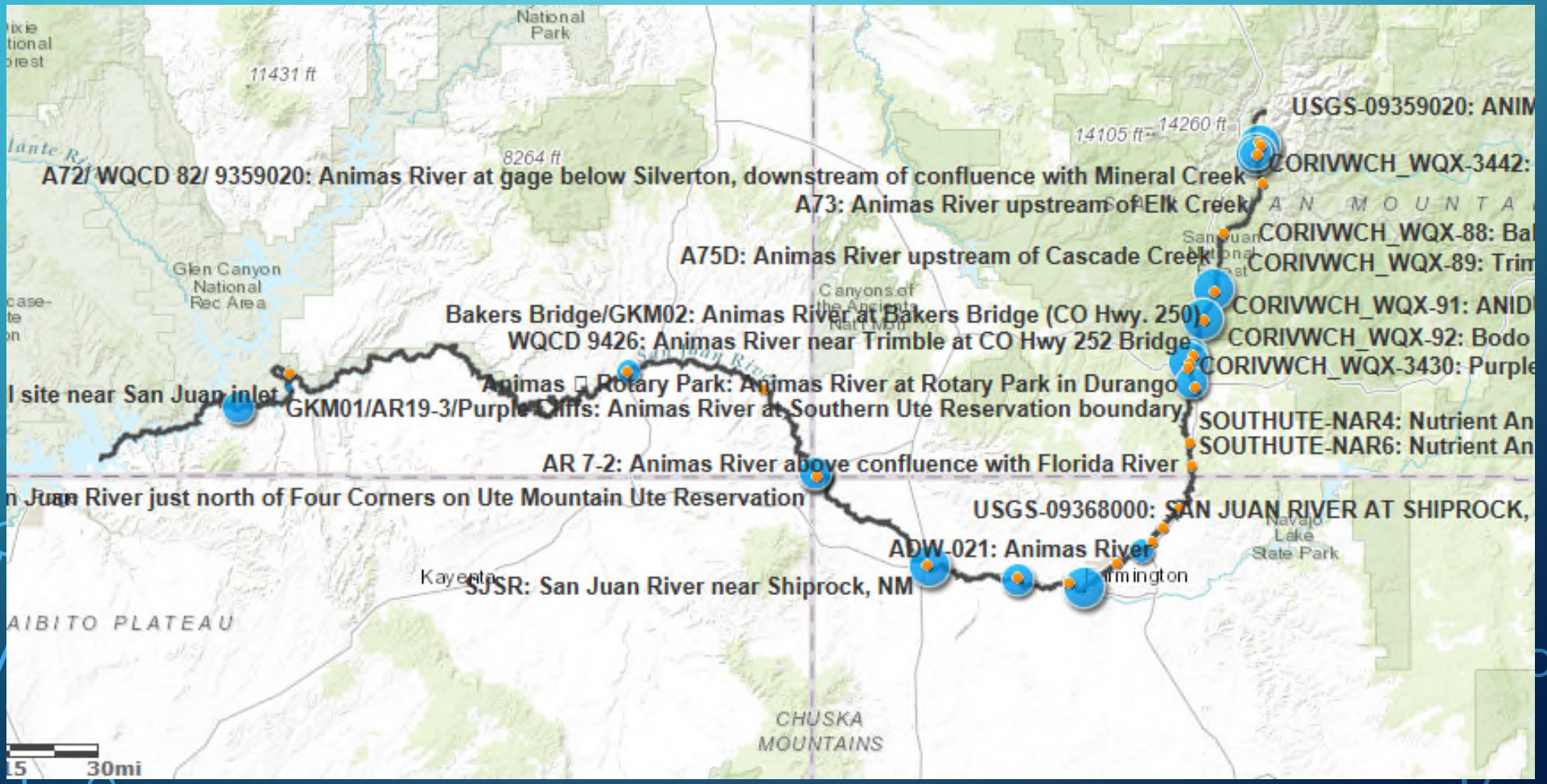
DAY 4: 8:00 AM – LET'S CREATE AN INTERACTIVE MAP

- Step 1: Use the Arc GIS Online downstream trace tool to create a line that represents the mainstem from the release point, downstream 400 miles
- Step 2: Run the mainstream trace through the Catchment Indexing Tool to get the corresponding NHD Plus Catchments
- Step 3: Match up stations with chosen catchments to determine which stations are on the mainstem and which aren't

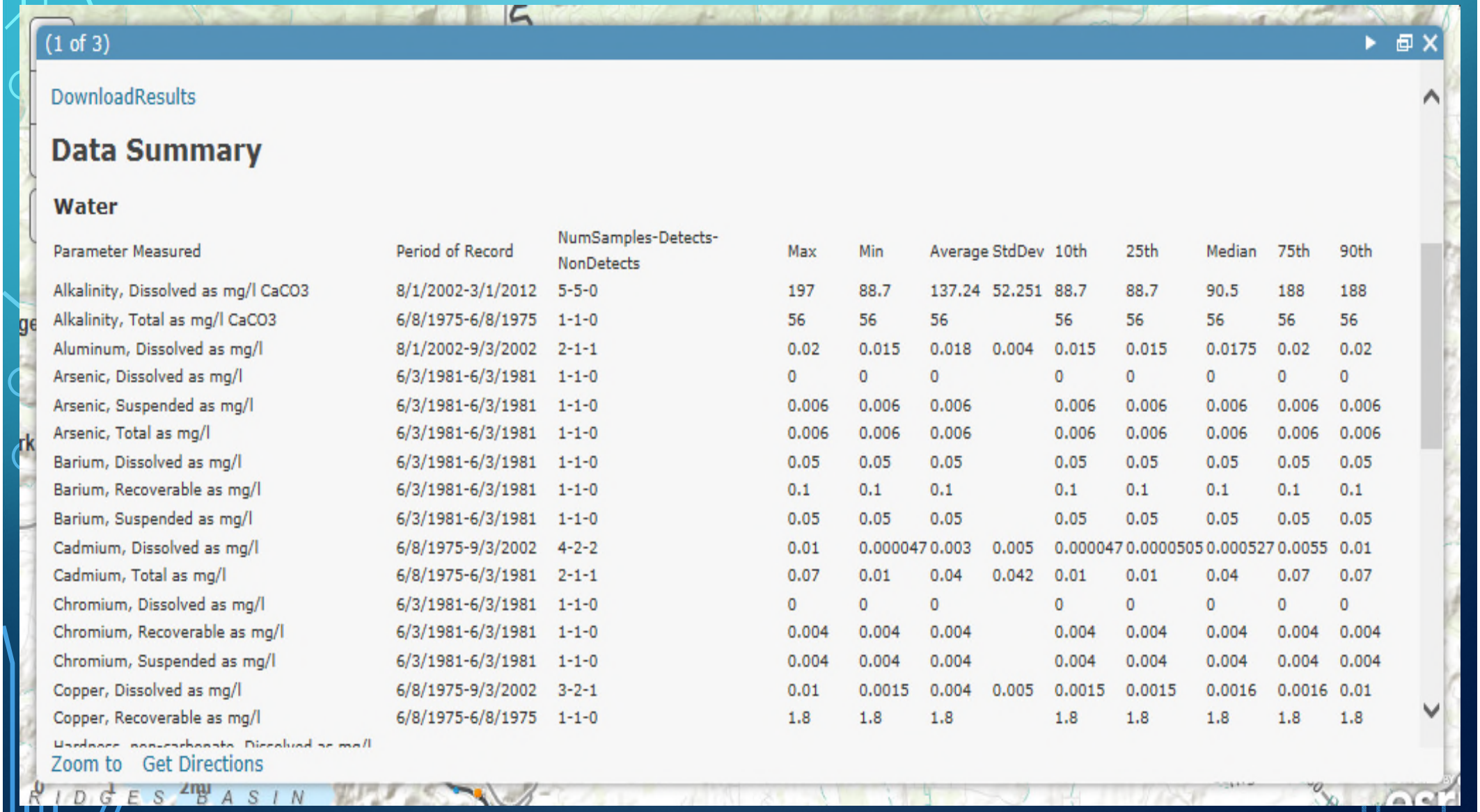
DAY 4: 9:30 AM – MATCH UP STATIONS WITH PLANNED FOLLOW-UP MONITORING STATIONS

- Using Arc GIS Online, identify which historical stations match up with planned follow-up monitoring stations
- Create a summary for each of these stations from the ACCESS database that contains the Portal data
- Convert those summaries into html so they can show up in the pop up on an Arc GIS Online map
- Generate a Portal web service request URL for each station to allow for the download of the data

DAY 4: 11:00 AM – MAKE THE MAP PRETTY



DAY 4: 1:00 PM – ADD SUMMARIES



(1 of 3)

DownloadResults

Data Summary

Water

Parameter Measured	Period of Record	NumSamples-Detects-NonDetects	Max	Min	Average	StdDev	10th	25th	Median	75th	90th
Alkalinity, Dissolved as mg/l CaCO3	8/1/2002-3/1/2012	5-5-0	197	88.7	137.24	52.251	88.7	88.7	90.5	188	188
Alkalinity, Total as mg/l CaCO3	6/8/1975-6/8/1975	1-1-0	56	56	56		56	56	56	56	56
Aluminum, Dissolved as mg/l	8/1/2002-9/3/2002	2-1-1	0.02	0.015	0.018	0.004	0.015	0.015	0.0175	0.02	0.02
Arsenic, Dissolved as mg/l	6/3/1981-6/3/1981	1-1-0	0	0	0		0	0	0	0	0
Arsenic, Suspended as mg/l	6/3/1981-6/3/1981	1-1-0	0.006	0.006	0.006		0.006	0.006	0.006	0.006	0.006
Arsenic, Total as mg/l	6/3/1981-6/3/1981	1-1-0	0.006	0.006	0.006		0.006	0.006	0.006	0.006	0.006
Barium, Dissolved as mg/l	6/3/1981-6/3/1981	1-1-0	0.05	0.05	0.05		0.05	0.05	0.05	0.05	0.05
Barium, Recoverable as mg/l	6/3/1981-6/3/1981	1-1-0	0.1	0.1	0.1		0.1	0.1	0.1	0.1	0.1
Barium, Suspended as mg/l	6/3/1981-6/3/1981	1-1-0	0.05	0.05	0.05		0.05	0.05	0.05	0.05	0.05
Cadmium, Dissolved as mg/l	6/8/1975-9/3/2002	4-2-2	0.01	0.000047	0.003	0.005	0.000047	0.0000505	0.000527	0.0055	0.01
Cadmium, Total as mg/l	6/8/1975-6/3/1981	2-1-1	0.07	0.01	0.04	0.042	0.01	0.01	0.04	0.07	0.07
Chromium, Dissolved as mg/l	6/3/1981-6/3/1981	1-1-0	0	0	0		0	0	0	0	0
Chromium, Recoverable as mg/l	6/3/1981-6/3/1981	1-1-0	0.004	0.004	0.004		0.004	0.004	0.004	0.004	0.004
Chromium, Suspended as mg/l	6/3/1981-6/3/1981	1-1-0	0.004	0.004	0.004		0.004	0.004	0.004	0.004	0.004
Copper, Dissolved as mg/l	6/8/1975-9/3/2002	3-2-1	0.01	0.0015	0.004	0.005	0.0015	0.0015	0.0016	0.0016	0.01
Copper, Recoverable as mg/l	6/8/1975-6/8/1975	1-1-0	1.8	1.8	1.8		1.8	1.8	1.8	1.8	1.8
Hardness, non-carbonate, Dissolved as mg/l											

Zoom to Get Directions

DAY 4: 2:00 PM – MAKE DATA DOWNLOAD TOOLS IN EXCEL TO MAKE IT EASY FOR FOLKS TO ACCESS DATA

	A	B	C	D	E	F	G	H
1	Limit By:							
2	Start Date (MM/DD/YYYY):		Show Station Summary for Selected Station (select 1)					
3	End Date (MM/DD/YYYY):	8/4/2015						
4	Sample Media:	Water	Retrieve Data for all stations					
5								
6	Station ID	Station Name	Station Type	First Sample	Last Sample	Num Samples	Water Samples	Sediment Sample
7	21COL001-000082	ANIMAS RIVER NEAR SILVERTON	River/Stream	7/2/1969	5/12/2008	520	Y	

Organization ID	Station ID	Activity ID	Activity Type	Media	Start Date	Start Time	Parameter Name	Sample Fraction
21COL001	21COL001-000082	21COL001-1969-01175FW-COLO1969 -0	Field Msr/Obs	Water	7/2/1969	0:00:00	pH	
21COL001	21COL001-000082	21COL001-1969-01175FW-COLO1969 -0	Field Msr/Obs	Water	7/2/1969	0:00:00	Temperature, water	
21COL001	21COL001-000082	21COL001-1969-01177LW-COLO1969 -0	Sample	Water	7/2/1969	0:00:00	Total Coliform	
21COL001	21COL001-000082	21COL001-1969-01177LW-COLO1969 -0	Sample	Water	7/2/1969	0:00:00	Ammonia-nitrogen	Total
21COL001	21COL001-000082	21COL001-1969-01177LW-COLO1969 -0	Sample	Water	7/2/1969	0:00:00	Nitrite	Total
21COL001	21COL001-000082	21COL001-1969-01177LW-COLO1969 -0	Sample	Water	7/2/1969	0:00:00	Hardness, Ca, Mg	Total
21COL001	21COL001-000082	21COL001-1969-01177LW-COLO1969 -0	Sample	Water	7/2/1969	0:00:00	Calcium as CaCO3	Total
21COL001	21COL001-000082	21COL001-1969-01177LW-COLO1969 -0	Sample	Water	7/2/1969	0:00:00	Ammonia-nitrogen as N	
21COL001	21COL001-000082	21COL001-1969-01177LW-COLO1969 -0	Sample	Water	7/2/1969	0:00:00	Biochemical oxygen demand, standard conditions	
21COL001	21COL001-000082	21COL001-1969-01177LW-COLO1969 -0	Sample	Water	7/2/1969	0:00:00	Total dissolved solids	Filterable
21COL001	21COL001-000082	21COL001-1969-01177LW-COLO1969 -0	Sample	Water	7/2/1969	0:00:00	MBAS	
21COL001	21COL001-000082	21COL001-1969-01177LW-COLO1969 -0	Sample	Water	7/2/1969	0:00:00	Lead	Total Recovrble
21COL001	21COL001-000082	21COL001-1969-01177LW-COLO1969 -0	Sample	Water	7/2/1969	0:00:00	Arsenic	Total
21COL001	21COL001-000082	21COL001-1969-01177LW-COLO1969 -0	Sample	Water	7/2/1969	0:00:00	Fecal Coliform	Total
21COL001	21COL001-000082	21COL001-1969-01177LW-COLO1969 -0	Sample	Water	7/2/1969	0:00:00	Cyanide	Dissolved
21COL001	21COL001-000082	21COL001-1969-01177LW-COLO1969 -0	Sample	Water	7/2/1969	0:00:00	Iron	Total Recovrble
21COL001	21COL001-000082	21COL001-1969-01177LW-COLO1969 -0	Sample	Water	7/2/1969	0:00:00	Boron	Total
21COL001	21COL001-000082	21COL001-1969-01177LW-COLO1969 -0	Sample	Water	7/2/1969	0:00:00	Chromium(VI)	Total
21COL001	21COL001-000082	21COL001-1969-01177LW-COLO1969 -0	Sample	Water	7/2/1969	0:00:00	Sulfate as SO4	Total
21COL001	21COL001-000082	21COL001-1969-01177LW-COLO1969 -0	Sample	Water	7/2/1969	0:00:00	Chloride	Total
21COL001	21COL001-000082	21COL001-1969-01177LW-COLO1969 -0	Sample	Water	7/2/1969	0:00:00	Nitrate	Total
21COL001	21COL001-000082	21COL001-1969-01177LW-COLO1969 -0	Sample	Water	7/2/1969	0:00:00	Ammonia	
21COL001	21COL001-000082	21COL001-1969-01177LW-COLO1969 -0	Sample	Water	7/2/1969	0:00:00	Manganese	Total Recovrble

DAY 4: 4:30 PM – SHARE EVERYTHING OUT AND CALL IT A DAY

After some testing of everything to make sure it all works, our hero shares out the products of a successful Tech-Friday

The Portal saved the day! Our hero was able to escape the quick sand without too many new gray hairs

Our hero, then proceeds to show his teenagers the cool stuff he was able to work on that day, only to receive a shoulder shrug and an 'Eh, whatever; yeah I guess it's cool.'

SOME LESSONS LEARNED

- The Portal allowed for the quick access to the data
- Web Services proved invaluable in being able to include the data in other applications
- The summaries were the hardest part. It would be nice if the Portal did that.
- Discovering what data were on the mainstem took some trickery. That would also be a nice improvement to the Portal.
- Data gets outdated quickly. It's important that data be consistently shared.

THE END?.....

QUESTIONS?

Dwane Young

Young.dwane@epa.gov

202-566-1214